## Assignment Problem Using QM

In this example, we will solve an assignment problem using linear programming with Excel QM.

The hospital administrator at St. Charles General Hospital must appoint head nurses to four newly established departments: urology, cardiology, orthopedic, and obstetrics. In anticipation of this staffing problem, she has hired four nurses: Hawkins, Condriac, Bardot, and Hoolihan. Each nurse has been ranked on a cost scale of 0 to 100 for each department; a 0 implies that she would be perfectly suited for the task; a 100 implies that the nurse is not at all suited to head the unit. The table below represents all possible assignments and nurse ratings. Which nurse should be assigned to which unit?

Nurse	Urology	Cardiology	Orthopedics	Obstetrics
Hawkins	28	18	15	75
Condriac	32	48	23	38
Bardot	51	36	24	36
Hoolihan	25	38	55	12

To figure this out, let's open Excel QM and solve our problem. Click on the **Excel QM** tab  $\rightarrow$  **Alphabetical**  $\rightarrow$  **Assignment**.

File	Hom	e Insert	t Pa	age Layout	Formula	; Dat	a R	eview	View	Excel QM								
chapter	Alphabet	0 <sup>2</sup> 3 4 Assignm Breakeve	ient	Gridlines Ø View	Headings 🔽 View	₩ Inst =f For		User preference		or Gr Default	preferences colors	Load Wind Calulato	ows Print on or 1 page Actio	sheet E	Unload Excel OM 4	eMail Web Site		<b>?</b> Help
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10		Simulati	on															
12		Statistics	(mean	, var, sd; No	rmal Dist)	+												
13		Transpor	rtation															
14		Waiting	Lines			+												
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16 17		Display (	QM Mo	dels Only														
18		Display A	All Mod	els														
19																		

In the Spreadsheet Initialization window, be sure to identify that we have four assignments and we want to minimize (recall that a value closer to zero is ideal).

Spreadsheet Initialization	×
Title:	Sheet name:
Enter the number of assignme	ents 4
Name for rows	Job
(Use A for A, B, C or a for	a, b, c)
Name for columns	Machine
Objective	
Maximize	Use Default Settings
Minimize	Help Cancel OK

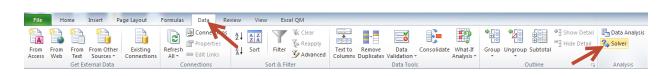
## Click **OK**. A spreadsheet will display.

	А	В	С	D	E	F	G	Н
1	Assignmen	nt						
2		Enter the	assignment	costs in the	shaded are	a Then do	to the DATA	
3			ne ribbon, cli					
4		click SOL						
5		If SOLVE	R is not on t	the Data Tab	) then please	e see the He	elp file	
6	Data							
7	COSTS	Machine 1	Machine 2	Machine 3	Machine 4			
8	Job 1							
9	Job 2							
10	Job 3							
11	Job 4							
12								
13	Assignments							
14	Shipments	Machine 1	Machine 2	Machine 3	Machine 4	<b>Row Total</b>		
15	Job 1					0		
16	Job 2					0		
17	Job 3					0		
18	Job 4					0		
19	Column Total	0	0	0	0	0		
20								
21	Total Cost	0					······	
22					•	• •	•	

Enter the data shown into the table.

	А	В	С	D	E	F	G	Н
1	Assignmer	nt						
2		Enter the	assignment	costs in the	shaded are	a. Then do i	to the DATA	
3			ne ribbon, cli					
4		click SOL						
5		If SOLVE	R is not on t	the Data Tab	then please	e see the He	elp file	
6	Data							
7	COSTS	Uro	Cardio	Ortho	OB			
8	Hawkins	28	18	15	75			
9	Condriac	32	48	23	38			
10	Bardot	51	36	24	36			
11	Hoolihan	25	38	55	12			
12								
13	Assignments							
14	Shipments	Uro	Cardio	Ortho	OB	<b>Row Total</b>		
15	Hawkins					0		
16	Condriac					0		
17	Bardot					0		
18	Hoolihan					0		
19	Column Total	0	0	0	0	0		
20								
21	Total Cost	0						
22								

That is it. Once you have the data entered correctly, click the **Data** tab and then **Solver**.



A Solver Parameters window will appear.

olver Parameters			
Se <u>t</u> Objective:	3\$21		
To: <u>M</u> ax <b>@</b> M	li <u>n (V</u> alue Of:	0	
By Changing Variable Cells:			
\$B\$15:\$E\$18			<b>E</b>
Subject to the Constraints:			
\$F\$15:\$F\$18 = 1 \$B\$19:\$E\$19 = 1		<b>^</b>	Add
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		[	<u>D</u> elete
		[	<u>R</u> eset All
		-	Load/Save
Make Unconstrained Variable	s Non-Negative	(	
Select a Solving Method:	Simplex LP	▼ (	Options
Solving Method			
Select the GRG Nonlinear engine engine for linear Solver Problem non-smooth.			
Help		Solve	Cl <u>o</u> se

Click **Solve** and then **OK** in the **Solver Results** window. Our results are shown below.

Data				
COSTS	Uro	Cardio	Ortho	OB
Hawkins	28	18	15	75
Condriac	32	48	23	38
Bardot	51	36	24	36
Hoolihan	25	38	55	12

Assignments					
					Row
Shipments	Uro	Cardio	Ortho	OB	Total
Hawkins		1			1
Condriac	1				1
Bardot			1		1
Hoolihan				1	1
Column					
Total	1	1	1	1	4

Total Cost 86

Assignment	Rating
Hawkins to cardiology	18
Condriac to urology	32
Bardot to orthopedics	24
Hoolihan to obstetrics	<u>12</u>
	Total "cost scale" 86

<u>Click here</u> to download the completed spreadsheet table so you can compare it to yours.

This concludes our tutorial on assignment problem using linear programming with Excel QM.